

**REMARKS**

Applicants respectfully request reconsideration of the above-captioned application. Non-elected claims 11-19 have been canceled without prejudice or disclaimer to the filing of a divisional application. Claims 3 and 5 have been amended as to a minor matter of form, and claim 1 has been amended to bring out one of the patentable distinctions of the present invention. New claims 20-27 have been added to reintroduce permutations of multiple dependency in claims 5 and 8, which were not captured in the Preliminary Amendment filed concurrently with the application.

The Office Action includes an objection to the title as allegedly not being descriptive. It is assumed that the Office was identifying that the title mentioned the method, which was not part of the elected claims. The title has been amended, but also to recite part of the structure, but without limitation to the scope of the claimed invention.

The Office Action mentions that the prior art cited in the specification was not in the form of an Information Disclosure Statement. The undersigned understands the Examiner's comments to indicate that he has not considered the references *per se*, rather than an indication that he has declined to review and understand the description thereof in the specification. If the Examiner is of a different mind, he is requested to clarify the record.

The Office Action includes an indication that the photographs are not normally permitted in utility design applications. Applicants respectfully request that the Examiner withdraw this objection insofar as Figures 9-14 are photographs which show the actual effects of the present invention, which might be relevant to determinations of patentability

if close prior art is discovered and a question arises as to the effectiveness of the present invention arises. To illustrate these details with drawings would be inappropriate insofar as drawings are generally not considered to scale and would not represent the advantages gained by the present invention. Should the Office withdraw this objection, a petition will be filed to gain entry of the photographs in accordance with 37 C.F.R. §1.184.

The Office Action includes a rejection of claims 1-5, 8 and 9 under 35 U.S.C. §103 as allegedly being unpatentable over the Victor patent (JP 2000-418429) and the Ahn et al patent (U.S. Patent No. 6,116,863).<sup>1</sup> This rejection is respectfully traversed.

The Victor patent discloses an optical deflector as a mirror section 9 which includes slots 9a in a direction which intersects perpendicularly with a center-of-oscillation shaft CL, and heights 9b formed on the rear face of the reflective mirror section 7. These heights 9b interlace with electrodes 10 and 11 on the right or left of the center-of-oscillation shaft CO to permit the reflective mirror section 7 to oscillate about the shaft. It is noted that the heights 9b of the mirror are disclosed to function as a rib to produce rigidity, as disclosed, for instance, in paragraphs 27 and 46 of the enclosed machine generated English translation thereof. Further, the center-of-oscillation shaft CO is in the form of a rib 20 which is also disclosed as improving rigidity, as explained in paragraph 34.<sup>2</sup>

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<sup>1</sup> It is noted in the body of the Office Action the Victor patent is described as "JP 2000-418429" whereas it is believed that the correct reference number is 2000-147419 as listed on the Notice of References Cited, PTO-892, accompanying the Office Action.

<sup>2</sup> Reliance is placed on the computer generated translation provided by the Japanese Patent Office, copy enclosed and listed on the accompanying form PTO-1449. The  
(continued...)

As such, applicants respectfully submit that a patentable distinction between the present invention and the applied art is the lack of "slots" in the present invention. Instead, the present invention, as positively recited in claim 1, includes a base plate, a plurality of driving comb-type electrodes which are formed parallel to each other on the bottom of the stage and a torsion bar with a predetermined length and thickness that is arranged at both ends of the stage forming one body with the stage in order to enable a see-saw motion of a stage, wherein the thickness of the torsion bar is less than that of the plurality of driving comb-type electrodes in a direction parallel to the plurality of driving comb-type electrodes. In this manner, the present invention can provide for greater flexibility of the stage and increased area between the driving comb-type electrodes and the fixed comb-type electrodes, in marked contrast to the Victor patent, which is primarily directed to the idea of providing a light but rigid structure which necessitates the formation of slots in a plate of uniform thickness including the thickness of the supporters 8.

This recitation is further refined in claims 8 and 20-23, wherein the front ends of the driving comb-type electrodes are recited to be on a common plane with the first frame layer. By analogy, it would be the bottoms of the slots of the Victor patent, which would have to be on a common plane with the frame layer, which they are not in the applied prior art.

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<sup>2</sup>(...continued)

provision of this translation does not constitute an Information Disclosure Statement insofar as the Examiner applied the reference.

Further, the Victor patent includes suggestions that would strongly teach away from the direction in which applicants have gone.

The Ahn et al patent is merely applied for allegedly teaching metal eutectic bonding, and, as such, even assuming *arguendo* some hypothetical combination of the Ahn et al patent with the Victor patent, the result would not meet the present invention as articulated above.

The Office Action also includes a rejection of claims 6 and 7 under 35 U.S.C. §103 as allegedly being unpatentable over the Victor patent and the Ahn et al patent, and in further view of the Nakagawa patent (JP 5-76186). This rejection is respectfully traversed.

First, it is not clear to the undersigned how the Nakagawa patent could suggest a change to the Victor device, whether viewed alone or in combination with the Ahn et al patent. The Nakagawa patent illustrates a fundamentally different approach, i.e., an approach that does not involve driving comb-type electrodes which are formed parallel to each other on the bottom of a stage and whose ends extend between the fixed comb-type structures. They are, instead, coplanar with the stage, to the degree an analogy can be drawn. Hence, applicants respectfully submit that the Nakagawa et al patent would not lead one of ordinary skill in the art to the present invention or, for that matter, to a modification of the Victor device that would meet the recitations of claims 6 and 7. Should the Examiner continue this rejection, it is requested that he explain his reasoning more thoroughly. In any event, the combination of teachings would not lead to the present invention for the reasons given above.

The Office Action also includes a rejection of claim 10 under 35 U.S.C. §103 as allegedly being unpatentable over the Victor patent and the Ahn et al patent, in further view of the Nishiguchi patent (U.S. Patent No. 5,064,782). This rejection is respectfully traversed.

The Nishiguchi patent merely is applied for allegedly teaching a multi-layer eutectic bond, the middle layer being Au/Sn. Even if one were to assume that the Nishiguchi patent taught a eutectic bond of this structure, a hypothetical combination of the applied art would nevertheless not result in the present invention for the reasons articulated above.

In light of the foregoing, applicants respectfully request reconsideration and allowance of the above-captioned application. Should any residual issues exist, the Office is invited to contact the undersigned at the number listed below.

Respectfully submitted,

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Date: April 3, 2003



**Attachment to Amendment**

**Mark-Up of Claims 1, 3 and 5**

1. (Amended) A micro-actuator comprising
  - a base plate on which a predetermined pattern of signal lines is formed;
  - a plurality of fixed comb-type electrodes that are arranged on the base plate and extend in a direction perpendicular to the base plate;
  - a stage capable of a see-saw motion that is arranged at a predetermined height from the top of the base plate;
  - a plurality of driving comb-type electrodes which are formed parallel to each other on the bottom of the stage and whose ends extend between the fixed comb-type electrodes;
  - a torsion bar with a predetermined length and thickness that is arranged at both ends of the stage forming one body with the stage in order to enable the see-saw motion of the stage, wherein the thickness of the torsion bar is less than the plurality of driving comb-type electrodes in a direction parallel to the plurality of driving comb-type electrodes;
  - a first frame layer connected to both ends of the torsion bar;
  - a second frame layer that is positioned below the first frame layer, thus forming a layered structure with the first frame layer; and
  - a metal eutectic bonding layer formed between the first and second frame layers to bond them together.

**Attachment to Amendment**

**Mark-Up of Claims 1, 3 and 5**

3. (Amended) The micro-actuator of claim 1, wherein  
the first frame layer has a shape of a rectangular border that surrounds the stage;  
a separate region of a predetermined width is [prepared] located between the first  
frame layer and the stage; and  
the torsion bar crosses the separate region.

5. (Twice Amended) The micro-actuator of claim 1, wherein  
the fixed comb-type electrodes are formed on an electrode base that is arranged on  
the base plate, and  
the electrode base, the fixed comb-type electrodes and the second frame layer are  
formed of the same material [plate].